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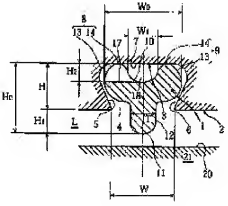
(54) LOW LOAD SEAL

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a low load seal exhibiting excellent sealing performance with low load to lengthen the service life of equipment.
SOLUTION: An annular load seal 1 mounted in an annular dovetail groove 3 having an opening 4, a first side wall surface 5, a second side wall surface 6 and a bottom wall surface 7, is formed in trifurcated cross section having a first arcuate part 8, a second arcuate part 9 and a projecting part 12 and comprising a recessed part 10 provided between the first arcuate part 8 and second arcuate part 9 in correspondence with the bottom wall surface 7.



DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the low load seal used for seal of a fluid.
[0002]
[Description of the Prior Art]Among various kinds of conventional seals, O ring 30 as shown in drawing 9 was common as a seal with which it is equipped in the dovetail groove 31. The seal 35 as shown in drawing 10 (it is a statement to the real extraction-of-a-square-root 3 No.-127866 gazette) was publicly known.
[0003]In the case of O ring 30 shown in drawing 9, the path of O ring 30 is greatly set up rather than the depth of the dovetail groove 31 provided in one member 32 (the shape of a cross section modification ellipse, or deformation ellipsoid shape), and some O rings 30 are made into external protrusion state from the opening of the dovetail groove 31. According to the path of O ring 30 being larger than the width of the opening of the dovetail groove 31, as shown in the figure (b), O ring 30 is omitted from the dovetail groove 31. 30a is the parting line (burr portion) formed in the longitudinal direction at the time of shaping of O ring 30. As a deer is carried out and it is shown in the figure (**), one member 32 and the member 33 of another side approach relatively, As shown in the figure (**), O ring 30 is pressed and crushed by the opposed face 34 of the member 33 of another side, the predetermined amount of crushing (rate) is given, and a fluid is sealed bordering on O ring 30 in the inside of it, and outside.
[0004]Real extraction of a square root The seal 35 given in the 3 No.-127866 gazette, the major-diameter arc part 36 side with which it is equipped in the cross section trapezoid dovetail groove 31 as shown in drawing 10 (b), and the opening side of the major-diameter arc part 36 to the dovetail groove 31 -- two forks -- it is formed in the concave pit part 38 provided between the bulged parts 37 and 37 of the couple which carried out swelling formation to **, and the bulged parts 37 and 37 of a couple, and **********.
The sucker part 39 is formed by the bulged parts 37 and 37 and the concave pit part 38 of a couple.
And when the members 32 and 33 of one side and another side approach mutually, the sucker part 39 is welded by pressure to the opposed face 34, the sucker part 39 sticks to the opposed face 34 by an adsorbing action, and he is trying to seal a fluid, as shown in the figure (**).
[0005]
[Problem(s) to be Solved by the Invention]However, in O ring 30 explained by drawing 9, big compressive load was taken to give the predetermined amount of crushing (rate), load was applied to each part article (on the other hand and the members 32 and 33 and O ring 30 of another side), and there was a problem that the life of apparatus (for example, semiconductor device etc.) became short. Since the path of O ring 30 is larger than the width of the opening of the dovetail groove 31, wearing is difficult, Furthermore, O ring 30 might be twisted at the time of wearing, there was a --- possibility that the --- parting line 30a from which the parting line 30a of O ring 30 serves as a sealing surface might contact the opposed face 34 of the member 33 of another side, and there was a possibility of spoiling sealing performance.
[0006]With each dimensional tolerance since it comprises much part mark for example, in the case of the gate valve whose member 33 of another side one member 32 is a gate and is a valve seat. A big difference arises in the compression amount of O ring 30, and since load changes excessively and bears the load, a mechanism part will be a excessive design. Or it is composed, and become the shortage of a compression amount in the state, and it becomes a cause of leak, or excessive load acts on O ring 30, and problems, such as an increase in a compression set, an increase in raising dust, and a crack development, occur. When both sides of a gate valve were the atmosphere versus a vacuum, or a vacuum versus a vacuum, it was difficult for a gate to change by the pressure differential, for a position to change by bending of a mechanism, and for the compression

amount of O ring 30 to change, and to acquire a suitable sealed state.
[0007]Since he is trying to force the sucker part 39 to the opposed face 34 strongly with the elasticity of the major-diameter arc part 36 like the figure (**) in the seal 35 explained by drawing 10, --- to which elastic deformation of the major-diameter arc part 36 is carried out greatly -- there was the --- necessity of giving the large amount of crushing, therefore there was a problem that the life of apparatus became short according to the big compressive load in that case. Since the bulged parts 37 and 37 of a couple were put by strong power by the members 32 and 33 of one side and another side, it was easy to receive damage.
[0008]By the way, the seal 40 shown in drawing 11 (it is a statement to JP,10-311430,A), It is attached in the cross section horseshoe-shaped slot 41, and have the shallow crevice 42 in the bottom wall surface side of the slot 41, and. It had the semicircular arc projected part 43 in the opening side of the slot 41, and the width by the side of the opening of the seal 40 was set up more greatly than the width of the slot 41, was pushed in as a letter of compression in the slot 41, and omission have escaped it. If the semicircular arc projected part 43 is pressed by the opposed face 34 of the member 33 of another side in the case of this seal 40, are trying to miss pushing modification of the semicircular arc projected part 43 in the crevice 42, but. Since the ratio of width dimension w_1 of the semicircular arc projected part 43 to the width dimension w of the slot 41 was large and the ratio of projection dimension h_1 from the opening of the semicircular arc projected part 43 to depth dimension h of the slot 41 was small, comparatively big compressive load had been taken to give the predetermined amount of crushing (rate).
[0009]The purpose of this invention solves such a problem, is excellent in the wearing nature to a dovetail groove, prevents it being twisted and being equipped into a dovetail groove, and it is at the point of providing the low load seal which demonstrates good sealing performance by low load, and prolongs the life of apparatus.
[0010]
[Means for Solving the Problem]In order to attain the above-mentioned purpose, a low load seal concerning this invention, An opening, and the 2nd 1st wall surface and wall surface that are approached as it approaches mutually at this opening side, The 1st arc part by the side of a periphery which is an annular low load seal with which it is equipped in an annular dovetail groove which has a bottom wall surface, bulges in the 1st wall surface side of the above, and contacts a bottom wall surface, The 2nd arc part by the side of inner circumference which bulges in the 2nd wall surface side of the above, and contacts a bottom wall surface, It has a lobe which it projects to the exterior through the above-mentioned opening from between a concave pit part which it corresponded to the above-mentioned bottom wall surface, and was provided between the 1st arc part of the above, and the 2nd arc part, and the 1st arc part of the above and the 2nd arc part, and has a tip arc part, and a ********** three-forked shape.
[0011]He provides one or more notch grooves in a side which corresponds to the low-tension side among the 1st arc part and the 2nd arc part, and is trying to miss a fluid of a gap part formed in a bottom wall surface of the 1st arc part, a concave pit part, the 2nd arc part, and a dovetail groove from the above-mentioned notch groove to the low-tension side.
[0012]He provides one or more notch grooves in a side which corresponds to the low-tension side among the 1st arc part and the 2nd arc part, and is trying to miss a fluid of a gap part formed in a gap part or the 2nd arc part formed in the 1st arc part and the 1st wall surface of a dovetail groove, and the 2nd wall surface of a dovetail groove from the above-mentioned notch groove to the low-tension side.
[0013]A parting line is formed in a part corresponding to the 1st wall surface in the 1st arc part, and a part corresponding to the 2nd wall surface in the 2nd arc part. Width dimensions of a concave pit part to a thickness dimension of a lobe are 60% - 190%.
[0014]A thickness dimension of a lobe is set up to 30% - 60% to a width dimension of an opening of a dovetail groove, and a projection dimension of a lobe from an opening of a dovetail groove is set up to 40% - 90% to a depth dimension of a dovetail groove.
[0015]
[Embodiment of the Invention]Hereafter, based on the drawing in which an embodiment is shown, this invention is explained in full detail.
[0016]Drawing 1 shows one gestalt of operation of the low load seal of this invention. This seal 1 is annularly formed with elastic bodies, such as rubber, and is used as a seal of --- opening and closing and for fixed flanges, for example, --- for gate valves of a semiconductor manufacturing device, and as shown in drawing 1, it is equipped with it in the annular cross section trapezoid dovetail groove 3 provided in the seal mounting member 2.

[0017]As shown in drawing 1 and drawing 3, the dovetail groove 3 of the seal mounting member 2 is cross section trapezoidal shape which has the opening 4, the 2nd 1st wall surface 5 and wall surface 6 that are approached as the opening 4 is approached mutually, and the bottom wall surface 7.
[0018]Next, when the sectional shape of the seal 1 is explained concretely, referring to drawing 1 - drawing 4, this seal 1, The 1st arc part 8 by the side of the periphery which bulges (it approaches or contacts like) and contacts the 1st wall surface 5 side in the mounting state of the dovetail groove 3 in the bottom wall surface 7, The 2nd arc part 9 by the side of the inner circumference which bulges (it approaches or contacts like) and contacts the 2nd wall surface 6 side in the bottom wall surface 7, The concave pit part 10 which it corresponded to the bottom wall surface 7, and was provided between the 1st arc part 8 and the 2nd arc part 9, They are the lobe 12 which it projects from between the 1st arc part 8 and the 2nd arc part 9 to the exterior through the opening 4, and has the tip arc part 11, and a ********** three-forked shape (shape lateral cross sectional shape of roundish abbreviated Y).
[0019]The 1st arc part 8 and the 2nd arc part 9 comprise the major diameter 13 of radius R_1, and the narrow diameter portion 14 of radius R_2 in more detail. The concave pit part 10 is formed in the concave curve of radius R_3, and is made into each narrow diameter portions 14 and 14 of the 1st-2nd arc part 8 and 9, and continuous state. The corners 15 and 15 which the lobe 12 is formed in the concave curve of radius R_5, and are made into each major diameters 13 and 13 of the 1st-2nd arc part 8 and 9, and continuous state, The linear shape connecting parts 16 and 16 which connect the above-mentioned tip arc part 11, and the tip arc part 11 and each corners 15 and 15 of radius R_4 are comprised.
[0020]He forms the one or more notch grooves 17 in the side which corresponds to the low-tension side L among 1st arc part 8 and the 2nd arc part 9, and is trying to miss the fluid of the gap part 18 formed in the bottom wall surface 7 of the 1st arc part 8, the concave pit part 10, the 2nd arc part 9, and the dovetail groove 3 from the notch groove 17 to the low-tension side L. According to this embodiment, the case where the notch groove 17 is established in the 1st arc part 8 is illustrated. When the seal 1 is compressed by this to be shown in drawing 4, by it, the fluid in the gap part 18 falls out to the low-tension side L through the notch groove 17. In the example of a figure, the pars basilaris ossis occipitalis of the notch groove 17 presents a straight line parallel to the bottom wall surface 7 in a cross section.
[0021]The parting lines 19 and 19 of the seal longitudinal direction are formed in the part corresponding to the 1st wall surface 5 of the dovetail groove 3 in the 1st arc part 8, and the part corresponding to the 2nd wall surface 6 of the dovetail groove 3 in the 2nd arc part 9. That is, he is trying to store the parting lines 19 and 19 (burr portion) formed in the lateral surface of the 1st-2nd arc part 8 and 9 in the dovetail groove 3 by equipping the dovetail groove 3 with the seal 1 (refer to drawing 3 and drawing 4). Also in which of a mounting state or a sealed state, the 1st arc part 8 may contact the 1st wall surface 5, or non-contact may be sufficient as it. Also in which of a mounting state or a sealed state, the 2nd arc part 9 may contact the 2nd wall surface 6, or non-contact may be sufficient as it.
[0022]Width dimension W_0 of the seal 1 is set up more greatly than the width dimension W of the opening 4 of the dovetail groove 3, and the seal 1 is kept from falling out from the dovetail groove 3, as a deer is carried out and it is shown in drawing 1. When equipping the dovetail groove 3 with the seal 1, by forming the concave pit part 10, the elastic deformation of the cross direction of the seal 1 becomes easy, the 1st-2nd arc part 8 and 9 is made to approach mutually, width can be made small, and smooth wearing can carry out.
[0023]Width dimension W_1 of the concave pit part 10 to the thickness dimension T of the lobe 12, It is set up to 100% - 190% (preferably 100% - 150%), and the thickness dimension T of the lobe 12 is set up to 30% - 60% (preferably 30% - 50%) to the width dimension W of the opening 4 of the dovetail groove 3. Height measurement H_0 of the seal 1 is larger than depth dimension H of the dovetail groove 3, and projection dimension H_1 of the lobe 12 from the opening 4 of the dovetail groove 3 is set up to 40% - 90% (preferably 40% - 70%) to depth dimension H of the dovetail groove 3 at this time. The above-mentioned notch groove 17 is made into notch depth size H_2 to the parting line 19 explained by drawing 3 from the bottom wall surface contacted part (narrow diameter portion 14) of the 1st arc part 8.
[0024]A deer is carried out, the seal mounting member 2 and the mating member 21 which were equipped with the seal 1 approach relatively, and, as for drawing 3, the tip arc part 11 of the lobe 12 shows the state where the companion face 20 of the mating member 21 was contacted. In this case, in order to explain as a gate valve, the seal mounting member 2 is made into gate 2', and the mating member 21 is made into valve-seat 21'.
[0025]And if gate 2' and valve-seat 21' approach further as shown in drawing 4, Compressive load (load of the load + bending direction of a compression direction) is added to the lobe 12 of the seal 1, and the tip arc part

11 is crushed at the bottom wall surface 7 side (the direction of arrow P) of the dovetail groove 3, it changes so that the gap parts 18 may decrease in number, and the 1st-2nd arc part 8 and 9 changes, and the predetermined amount of crushing (rate) is given.

[0026]At this time, the relation between load and displacement is shown as the gently-sloping (it is linear) displacement load characteristic between the point a and the point b, as shown in graph-lines A of drawing 5. When the seal 1 is further compressed from the state of drawing 4, the displacement load characteristic of the steep slope between the point b and the point c of graph-lines A is shown, and this characteristic becomes an O ring (refer to drawing 6) and a similar thing. That is, big compressive load is needed. Even if this is a case where it is regulated so that gate 2' and valve-seat 21' may not contact, it is for preventing both contact further and preventing the foreign matter generation by contact.

[0027]By the way, drawing 6 is graph charts which compare the displacement load characteristic of the low load seal of this invention shown by graph-lines A with the displacement load characteristic of the O ring shown by graph-lines B. When F is made into allowable load (or design load), allowable displacement of an O ring is set to deltaB, and allowable displacement of this invention is set to deltaA. At this time, the displacement load characteristic of an O ring from graph-lines B, Since [which increases / the displacement load characteristic of this invention / from graph-lines A-like / load / proportionally / to displacement to it being rounded that load increases rapidly to displacement the 2nd order] it is linear, as for deltaA, it turns out that it is large substantially rather than deltaB. That is, although the predetermined amount of crushing is given, this invention means ending with power (low load) smaller than an O ring.

[0028]As a deer is carried out and it is shown in drawing 4, bordering on the tip arc part 11 of the seal 1, and the companion face 20 of valve-seat 21', And bordering on the 2nd arc part 9 of the seal 1, and the dovetail groove 3 of gate 2', the major diameter 13 and the narrow diameter portion 14 of the 2nd arc part 9 stick to the 2nd wall surface 6 and the bottom wall surface 7 of the dovetail groove 3, respectively, and --- and a fluid are sealed by the --- concrete target. Since it will not be twisted at this time if the dovetail groove 3 is equipped with the seal 1, the parting line 19 does not contact the companion face 20. when the lobe 12 contacts the companion face 20 and the tip arc part 11 is crushed, the concave pit part 10 changes (contraction) and the predetermined amount of crushing is obtained by small (it mentioned above -- as) compressive load by easing stress. Since the 1st-2nd arc part 8 and 9 and the tip arc part 11 of the lobe 12 are formed in R shape, where the seal 1 is crushed, stress concentrates and sealing performance becomes good.

[0029]Although it explained that width dimension W_1 of the concave pit part 10 to the thickness dimension T of the lobe 12 was set up to 100% - 190% in drawing 1, the lobe 12 becomes it difficult to be crushed in the bottom wall surface 7 side of the dovetail groove 3 to be less than 100%, and the load of the compression direction of the lobe 12 becomes large -- moreover -- If 190% is exceeded, the thickness of the 1st-2nd arc part 8 and 9 will produce the problem that become thin and sealing performance is spoiled. Although it explained that the thickness dimension T of the lobe 12 was set up to 30% - 60% to the width dimension W of the opening 4 of the dovetail groove 3, Since the thickness of the lobe 12 becomes it thin that it is less than 30% and it becomes easy to bend, if a problem is produced in sealing performance and 60% is exceeded, the compressive load over the lobe 12 will become excessive.

[0030]Although it explained that projection dimension H_1 of the lobe 12 from the opening 4 of the dovetail groove 3 was set up to 40% - 90% to depth dimension H of the dovetail groove 3 in drawing 1, It crushes that it is less than 40%, there is too little quantity, sealing performance falls, and since the lobe 12 will bend easily if 90% is exceeded, the load of a compression direction becomes difficult to be applied, and the problem that sealing performance falls is produced.

[0031]Next, drawing 7 shows other embodiments of the low load seal of this invention. This seal 1 is also annularly formed with elastic bodies, such as rubber, and is used as a seal of --- opening and closing and for fixed flanges, for example, --- for gate valves of a semiconductor manufacturing device, and it is equipped with it in the annular cross section trapezoid dovetail groove 3 provided in the seal mounting member 2.

[0032]In this embodiment, the dovetail groove 3 of the seal mounting member 2, The opening 4, and the 2nd 1st wall surface 5 and wall surface 6 that are approached as the opening 4 is approached mutually, In the merits neighborhood of shape of cross section modification ellipse, or deformation ellipsoid shape --- ellipse, or ellipse type which has the bottom wall surface 7, it is notch **** shape --- and the curved surface part is formed [to / from the bottom wall surface 7 / near the opening 4] in the 1st wall surface 5 and the 2nd wall surface 6 at the opening 4. That is, this dovetail groove 3 is applied to the O ring. This seal 1 corresponds to the dovetail groove 3 applied to the O ring.

[0033]Next, if the sectional shape of the seal 1 is explained concretely, referring to drawing 7 and drawing 8,

The 1st arc part 8 by the side of the periphery which this seal 1 bulges in the mounting state of the dovetail groove 3 (like what was explained by drawing 1) at the 1st wall surface 5 side (it approaches or contacts like), and contacts the bottom wall surface 7, The 2nd arc part 9 by the side of the inner circumference which bulges (it approaches or contacts like) and contacts the 2nd wall surface 6 side in the bottom wall surface 7, The concave pit part 10 which it corresponded to the bottom wall surface 7, and was provided between the 1st arc part 8 and the 2nd arc part 9, They are the lobe 12 which it projects from between the 1st arc part 8 and the 2nd arc part 9 to the exterior through the opening 4, and has the tip arc part 11, and a ********** three-forked shape (shape lateral cross sectional shape of roundish abbreviated Y).

[0034]The 1st arc part 8 and the 2nd arc part 9 comprise in more detail the linear shape connecting part 22 which connects the major diameter 13 of radius R_1, the narrow diameter portion 14 of radius R_2, and the major diameter 13 and the narrow diameter portion 14. The concave pit part 10 comprises the linear shape connecting parts 25 and 25 which connect the concave curve part 24 of radius R_3, and each narrow diameter portions 14 and 14 and the concave curve part 24 of the 1st-2nd arc part 8 and 9. The corners 15 and 15 which the lobe 12 is formed in the concave curve of radius R_5, and are made into each major diameters 13 and 13 of the 1st-2nd arc part 8 and 9, and continuous state, The linear shape connecting parts 16 and 16 which connect the above-mentioned tip arc part 11, and the tip arc part 11 and each corners 15 and 15 of radius R_4 are comprised.

[0035]In the side which corresponds to the low-tension side L among 1st arc part 8 and the 2nd arc part 9. He forms the one or more notch grooves 17, and is trying to miss the fluid of the gap part 26 formed in the gap part 26 or the 2nd arc part 8 formed in the 1st arc part 8 and the 1st wall surface 5 of the dovetail groove 3, and the 2nd wall surface 6 of the dovetail groove 3 from the notch groove 27 to the low-tension side L. In the example of a figure, the pars basilaris ossis occipitalis of this notch groove 27 presents the straight line of the bottom wall surface 7 and direction crossing at a right angle in a cross section. In this embodiment, the case where the notch groove 17 is established in the 1st arc part 8 is illustrated. When the seal 1 is compressed by this, by it, the fluid in the gap part 26 falls out to the low-tension side L through the notch groove 27. At least one or more drilled holes (graphic display abbreviation) are established in the bottom wall surface 7 of the dovetail groove 3 of the seal mounting member 2 in this case, and he is trying to miss the air of the gap part 18 between the seal 1 and the dovetail groove 3 outside through a drilled hole.

[0036]The 1st arc part 8 at least the part corresponding to the 1st wall surface 5 of the dovetail groove 3, By forming the parting lines 19 and 19 of the seal longitudinal direction in the part corresponding to the 2nd wall surface 6 of the dovetail groove 3 in the 2nd arc part 9, and equipping the dovetail groove 3 with the seal 1, He is trying to store the parting lines 19 and 19 (burr portion) formed in the lateral surface of the 1st-2nd arc part 8 and 9 in the dovetail groove 3. Also in which of a mounting state or a sealed state, the 1st arc part 8 may contact the 1st wall surface 5, or non-contact may be sufficient as it. Also in which of a mounting state or a sealed state, the 2nd arc part 9 may contact the 2nd wall surface 6, or non-contact may be sufficient as it.

[0037]Also in this seal 1, it is larger than the width dimension W of the opening 4 of the dovetail groove 3, width dimension W_0 of the seal 1 is set up, and the seal 1 is kept from falling out from the dovetail groove 3, as a deer is carried out and it is shown in drawing 7. When equipping the dovetail groove 3 with the seal 1, by forming the concave pit part 10, the elastic deformation of the cross direction of the seal 1 becomes easy, the 1st-2nd arc part 8 and 9 is made to approach mutually, width can be made small, and smooth wearing can carry out.

[0038]Width dimension W_1 of the concave pit part 10 to the thickness dimension T of the lobe 12, It is set up to 60% - 100% (preferably 80% - 100%), and the thickness dimension T of the lobe 12 is set up to 30% - 60% (preferably 30% - 50%) to the width dimension W of the opening 4 of the dovetail groove 3. Height measurement H_0 of the seal 1 is larger than depth dimension H of the dovetail groove 3, and projection dimension H_1 of the lobe 12 from the opening 4 of the dovetail groove 3 is set up to 40% - 90% (preferably 40% - 70%) to depth dimension H of the dovetail groove 3 at this time.

[0039]If a deer is carried out, the seal mounting member 2 and the mating member 21 which were equipped with the seal 1 approach relatively and compressive load (load of the load + bending direction of a compression direction) is added to the lobe 12 of the seal 1, The tip arc part 11 is crushed at the bottom wall surface 7 side of the dovetail groove 3, it changes so that the gap parts 18 formed in the 1st-2nd arc part 8 and 9, the concave pit part 10, and the bottom wall surface 7 of the dovetail groove 3 may decrease in number, and the 1st-2nd arc part 8 and 9 changes, and the predetermined amount of crushing (rate) is given (refer to drawing 4). At this time, each narrow diameter portions 14 and 14 of the 1st arc part 8 and the 2nd arc part 9 stick to the bottom wall surface 7 of the dovetail groove 3, respectively, and seal a fluid.

[0040]Although it explained that width dimension W_1 of the concave pit part 10 to the thickness dimension T of the lobe 12 was set up to 60% - 100% in drawing 7, The lobe 12 becomes it difficult to be crushed in the bottom wall surface 7 side of the dovetail groove 3 to be less than 60%, the load of the compression direction of the lobe 12 becomes large -- moreover -- If 100% is exceeded, each narrow diameter portions 14 and 14 of the 1st-2nd arc part 8 and 9 will serve as shape which contacts the curved surface part of the 1st-2nd wall surface 5 and 6 of dovetail-groove --- applied to the dovetail-groove 3 --- O ring, and, Variation will arise in height (projection dimension H_1 of the lobe 12) according to the mounting state to the dovetail groove 3 of the seal 1. Although it explained that the thickness dimension T of the lobe 12 was set up to 30% - 60% to the width dimension W of the opening 4 of the dovetail groove 3, Since the thickness of the lobe 12 becomes it thin that it is less than 30% and it becomes easy to bend, if a problem is produced in sealing performance and 50% is exceeded, the compressive load over the lobe 12 will become excessive.
[0041]Although it explained that projection dimension H_1 of the lobe 12 from the opening 4 of the dovetail groove 3 was set up to 40% - 90% to depth dimension H of the dovetail groove 3 in drawing 7, It crushes that it is less than 40%, there is too little quantity, sealing performance falls, and since the lobe 12 will bend easily if 90% is exceeded, the load of a compression direction becomes difficult to be applied, and the problem that sealing performance falls is produced.
[0042]This invention is not limited to an above-mentioned embodiment, for example, the arc shape which comprises only the major diameter 13 may be sufficient, or the lateral cross sectional shape of the 1st-2nd arc part 8 and 9 of the seal 1 is freedom, such as considering it as the shape of the combination of three or more circles drawn fluctuating radius R_1 slightly. Although the seal 1 explained by drawing 1 and drawing 7 explains the case where the notch grooves 17 and 27 are established in the 1st arc part 8 by the side of a periphery, the notch grooves 17 and 27 may be established in the 2nd arc part 9 by the side of inner circumference.
[0043]The notch groove 17 explained by drawing 1 is applied to the seal 1 explained by drawing 7, or ** which applies the notch groove 27 explained by drawing 7 on the contrary to the seal 1 explained by drawing 1 is good. the notch groove 17 parallel to the bottom wall surface 7 of the dovetail groove 3 and the notch groove of L shape which formed successively the notch grooves 27 of direction crossing at a right angle to the bottom wall surface 7 -- also providing -- it is good.
[0044]
[Effect of the Invention]Since this invention is constituted like ****, the effect indicated below is done so.
[0045](according to claim 1)
** A load variation decreases to big displacement of the seal 1, there is also little change of a compression amount and the influence on a seal characteristic excels [change] in sealing performance.
** Since a proper load value is acquired, low load-ization can be realized, the life of mechanisms, such as a valve, can be prolonged, a weight saving can be performed, and the whole can be cheaply manufactured by it.
** Accuracy is not required of the parallelism between sealing surfaces which counters too much, but manufacture becomes easy.
** Since the displacement load characteristic like an O ring is shown when compressive load becomes large, the contact between members of the both sides of the seal mounting member 2 and the mating member 21 (for example, gate 2' and valve-seat 21') can be prevented like the conventional O ring.
** Since there are few load changes, there is no generating of excessive stress, and degradation of seal 1 the very thing can be controlled.
** The wearing nature to the dovetail groove 3 is good, and it can equip, without being twisted.
** Since elastic compressibility is small compared with the conventional O ring, permanent compressive strain decrease.
[0046](according to claim 2) The fluid in the gap part 18 can fall out smoothly to the low-tension side L at the time of seal compression. Therefore, partial fluid ****** is not formed in the gap part 18, it is compressed uniformly, and leak by the shortage of a compression amount does not arise.
[0047](according to claim 3) The fluid of the gap part 26 formed in the gap part 26 or the 2nd arc part 9 formed in the 1st arc part 8 and the 1st wall surface 5 of the dovetail groove 3 at the time of seal compression, and the 2nd wall surface 6 of the dovetail groove 3 can be smoothly missed from the notch groove 27 to the low-tension side L.
[0048](according to claim 4) Since it is equipped with the seal 1, without being twisted to the dovetail groove 3, the parting line 19 does not come to a sealing surface (companion face 20), and sealing performance is not spoiled.

[0049](according to claim 5) The optimal compression amount (the amount of crushing) can be obtained by low load, maintaining sealing performance. The low load seal corresponding to the dovetail groove 3 of the shape of a cross section (shown in drawing 7) modification ellipse for O rings or deformation ellipsoid shape can be obtained, and even if it does not remake the dovetail groove 3 for O rings provided in the existing device, the seal 1 of this invention can be used.

[0050](according to claim 6) Since the tip of the lobe 12 can bear for bending, **** does not arise like an O ring, dust generating can be controlled, and the distance from the seal start of the seal 1 to an end is long, and since a load change has linearity, the shock at the time of seal becomes small. Therefore, it is suitable for the use to the gate valve for wafer conveyance.

[Translation done.]